

CASE REPORT

Split Cast Metal Post and Core

Devendra Chopra, Naorem Satish Kumar Singh, Parag Nehete

ABSTRACT

The best plan for success is to begin with the end in mind. It generally is agreed that the successful treatment of a badly broken down tooth with pulpal disease depends not only good endodontic therapy, but also on good prosthetic reconstruction of the tooth after endodontic therapy. The primary purpose of the post is to retain a core that can be used to retain definitive prostheses. A post and core help prevent coronal fractures when the remaining coronal structure is very thin after tooth preparation. When a substantial amount of coronal structure is lost a cast post and core is indicated. In this clinical report the root canal treated left mandibular first molar is restored with split cast metal post and core design using the direct technique for the fabrication of the post and core pattern using the autopolymerizing acrylic resin material and then further casted in the laboratory using the base metal alloy.

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INTRODUCTION

Endodontically treated posterior teeth are subjected to greater loading than anterior teeth because of their closer proximity to the transverse horizontal axis. Careful occlusal adjustment will reduce potentially damaging lateral forces during excursive movements. Nevertheless, endodontically treated posterior tooth should receive cuspal coverage to prevent biting forces from causing fracture. Possible exceptions are mandibular premolars and first molars with intact marginal ridges and conservative access cavities not subjected to excessive occlusal forces. Relatively long posts with a circular cross-section provide good retention and support in anterior teeth but should be avoided in posterior teeth, which often have curved roots and elliptical or ribbon-shaped canals. For these teeth, retention is better provided by two or more relatively short posts in the divergent canals.¹

Canal configuration aids in making a choice between a custom-designed post and a prefabricated post.^{2,3} If the selected post closely fits or conforms to the canal shape and size, it may be a more conservative option because less dentin removal is required, thus enhancing fracture resistance of the tooth, as well as retention of the post.^{4,5} It has been suggested that if a canal requires extensive preparation, a well-adapted cast post and core restoration will be more retentive than a prefabricated post that does not match the canal shape.⁶ The cast post and core is custom

fitted to the prepared root canal space and designed to resist torsional forces.

Tooth reduction for an full veneer crown combined with the dentin lost during access preparation usually leave minimal foundation for the retention of an artificial crown; thus the cast post and core is usually the coronoradicular stabilizer of choice for multirooted teeth. The cast post and core should be passively fitted to the prepared root canal space and designed to resist rotational forces.⁷

Indications for Split Cast Metal Post and Core

For multirooted teeth with divergent roots having grossly decayed coronal tooth structure.

Where to Prepare

1. **Maxillary molars:**
Primary canal – Palatal canal
Secondary canal – Mesio Buccal or Distobuccal
2. **Mandibular molars:**
Primary canal – Distal canal
Secondary canal – Mesio Buccal or Mesiolingual canal

CASE REPORT

A 24-year-old male patient with a root canal treated mandibular first molar (36) came to the prosthodontic clinic with grossly decayed coronal structure. Treatment options figured out were:

- Restoration of the fracture tooth using post core with fabrication of cast crown.
- Amalgam coronal radicular dowel pour.
- Restored the fracture tooth using miracle mix/ admix.
- Composite restoration.
- Amalgam restoration.

It was planned to rehabilitate the tooth with custom-made split cast metal post and core and further with cast metal crown. Other treatment options were omitted due to their unreliability. As the coronal structure of the tooth was grossly decayed amalgam coronal radicular pour and restoring the fracture tooth using admix was ruled out due to their reduce tolerance to functional stresses and diminished strength to retain a core for subsequent cast metal crown. Composite and amalgam restorations were also ruled out for the same reason.

In the following case report direct technique for fabricating the pattern of post and core of the split mouth design has been discussed. The material used for

fabrication the post and core pattern was autopolymerizing acrylic resin and the patterns were fabricated with the help of bead-brush technique. Further the patterns are casted using the conventional lost wax technique in base metal alloy and then adjusted in the canals one by one. After the adjustment the cementation of the post has been done with resin cement.

Procedure

1. After removing the gutta percha material the canals were prepared with the help of the piezoreamer while leaving 4 to 5 mm gutta percha for the apical seal (Fig. 1).
2. Lightly lubricate the primary canal (distal) and notch the loose fitting plastic dowel. It should extend to the full depth of the prepared canal.
3. Use the bead – brush technique to add resin to the dowel and seat it in the prepared canal.
4. This should be done in two steps: Add resin to the canal orifice first. An alternative is to mix some resin and roll it into a thin cylinder. This is introduced into the canal

and pushed to place with the monomer—moistened plastic dowel.

5. Do not allow the resin to harden fully within the canal. Loosen and reseat it several times while it is still rubbery.
6. Once the resin has polymerized, remove the pattern.
7. Identify any undercuts that can be trimmed away carefully with a scalpel.
8. The same procedure was being performed for the fabrication of the post pattern for the secondary canal, i.e. the mesiobuccal canal (Figs 2A and B)

The post pattern is complete when it can be inserted and removed easily without binding the canal. Once the pattern has been made additional autopolymerizing resin for the fabrication of the core. When the patterns for the both the canal has been fabricated it is being sprued, invested and casted in a base metal alloy (Fig. 3). After finishing the casting both post with a metal core have been adjusted inside the primary (distal) and secondary (mesiobuccal) canals one by one. After the adjustment are done both the posts are cemented with resin cement (Fig. 4). Final restoration is being done with full veneer cast metal crown (Fig. 5).



Fig. 1: Post space preparation of the mesiobuccal and distal canals



Fig. 2A: Post patterns for mesiobuccal and distal inside the canals





Fig. 2B: Post patterns for mesiobuccal and distal canals



Fig. 3: Adjusted mesiobuccal and distal post



Fig. 4: Cementation of the post

DISCUSSION

A pulpless tooth has commonly lost substantial tooth structure as a result of previous restorations, dental caries, and the access preparation for endodontic therapy. Consequently, a pulpless tooth requires a restoration that conserves and protects the remaining tooth structure. It has been reported that a large number of endodontically treated teeth are restored to their original function with the use of intraradicular devices. These devices vary from a conventional custom cast post and core to one-visit techniques, using commercially available prefabricated post systems.^{8,9}

Markus Balkenhol et al in their longitudinal study concluded that post and cores custom-fabricated using a standardized fabrication technique have a good long-term prognosis. Posts and cores are commonly required with pulpless teeth. Custom-cast posts and cores are generally recommended for posterior as well as anterior teeth with grossly decayed crown structure. The cast post and core is custom fitted to the prepared root canal space and designed to resist torsional forces. Morgano SM, Heydeche G, Mentin AG quoted custom-fabricated, cast post and cores are still regarded as the established technique or gold standard for restoring extensively damaged teeth.¹⁰⁻¹²

The presence of a split for the post system reduces insertion and cementation stresses for this post system. The split may act as a vent for release of hydrostatic pressure during cementation of the post into the canal and minimizes stresses during cementation.¹³ Ash M, Smith CT stated that canal configuration aids in making a choice between a custom-designed post and a prefabricated post. If the



Fig. 5: Cast metal crown

selected post closely fits or conforms to the canal shape and size, it may be a more conservative option because less dentin removal is required, thus enhancing fracture resistance of the tooth, as well as retention of the post. The primary reason for using a post is to retain the core that substitutes the missing coronal tooth structure. Therefore, the post head design is an important factor. The post head should provide adequate retention and resistance to displacement of the core material. Studies^{7,14} have reported that prefabricated metal posts with direct cores made of glass ionomer, composite, or amalgam are less reliable than a one-piece cast post and core because of the interface between the post and the core.

CONCLUSION

The clinician should be knowledgeable in selecting the right type of post and core systems to meet the biological, mechanical, and esthetic needs for each individual tooth. An ideal post system should have the ability to distribute the functional stresses evenly along the root surface, should be esthetically compatible with the definitive restoration and surrounding tissue and produce minimal stress during placement and cementation. Custom-cast post and cores are recommended for noncircular root canals and when coronal tooth structure loss is moderate-to-severe. The recommendations for the split cast metal post and core design discussed here for teeth having divergent roots, with canals not allowing the same path of insertion for the posts. In this case report there is a different path of insertion for both the posts. Seating the post first in the distal canal is being followed by the seating the post in the mesiobuccal canal of the mandibular molar. Simplified design and ease of fabrication are the major advantages of this case report. The technique can be accomplished in any dental clinic without using any complicated equipments.

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